SEPTIC SYSTEMS in the YUKON

A Guide to their Design and Maintenance

Application and Permits
Operation and Maintenance
Design and Installation
System Description

Water, Sewage and Environmental Health

WATER, SEWAGE AND ENVIRONMENTAL HEALTH

Properly operating septic systems are a good way to control water-related disease. Bacteria, viruses and parasites found in sewage are the principal causes of water-related disease, such as various gastro-intestinal illnesses, hepatitis A and Giardiasis (Beaver Fever). Sewage from toilets is classified as *black water* and all other domestic sewage–for example, wastewater from the shower, kitchen sink, washing machine, etc.–is referred to as *grey water*.

Both grey and black water can be expected to contain significant numbers of disease-causing microorganisms. Some people believe that grey water can bypass the septic tank or other sewage treatment system, but this tends to ignore the characteristics of such waste. Grey water typically contains between one and three million faecal coliforms and between three and ten thousand Faecal Streptococci microorganisms per 100 ml. These "indicator" types confirm the potential presence of a wide range of disease-causing microorganisms originating in the intestines of humans and animals. Additionally, grey water tends to have sufficiently high levels of suspended solids and fat that, without pretreatment, nuisance conditions can result and health risks arise when it is discharged into the ground.

Full treatment of septic tank effluent requires that it be discharged into the unsaturated soil zone. This discharge, at an appropriate rate, will fully utilize the treatment available through filtration and chemical/biological breakdown processes. Disease-causing organisms can survive for longer periods during prolonged cold spells in the Yukon. Their containment and eventual breakdown beneath the ground surface protects human and animal health. Travel through one to two feet of unsaturated silty, sandy, or clay loam soil can be expected to remove the sewage microorganisms, and protect ground and surface water. Protection of the environment and the public health is further enhanced because of the required set-back distances, the safety zones established for surface water, wells and property lines. Soil conditions vary and a greater unsaturated soil depth and/or a sand filter is required in coarse, granular soils. In the Yukon, many areas are suitable for soil absorption systems. However, there are some situations where they cannot be used. Factors preventing installation include lot size, soil type, and the proximity of bedrock, high water table or permafrost.

The septic system should receive all discharges from toilets, and the waste from baths, washbasins, showers, sinks and washing machines. Surface water from roofs, yards and foundation drainage, together with spring run-off, must be excluded from the septic tank and absorption bed area.

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HOW A SEPTIC SYSTEM WORKS

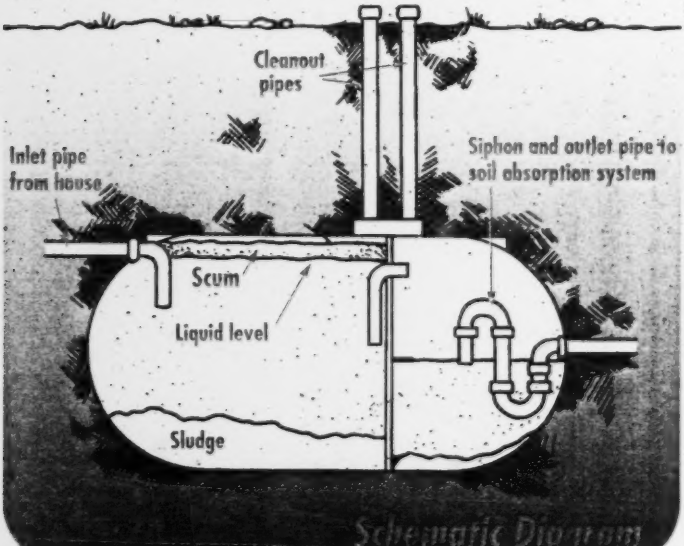
A septic system consists of two main components: a *septic tank* and a *soil absorption system*.

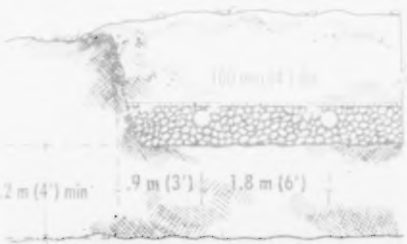
A septic tank is a two-compartment, watertight container which is used to pretreat household sewage (black and grey water) before it enters the soil absorption system. The sewage stays in the first compartment long enough to enable the heavier solids to settle out to the bottom and the lighter solids, including fats and grease, to rise to the surface and form a scum layer. The retained sludge and scum undergo partial digestion and conversion to a liquid form acceptable to the receiving ground. A properly designed and maintained septic tank can remove most of the settleable solids before it is discharged into the soil absorption system.

A siphon chamber, which is usually incorporated in the tank, stores the effluent and intermittently discharges it to the absorption system in large flushes. The owner should inspect the septic tank to ensure that the baffles have been properly installed and test the siphon before it is backfilled.

All components of a sewage disposal system must meet appropriate CSA standards.

Typical Septic Tank Cross-Section



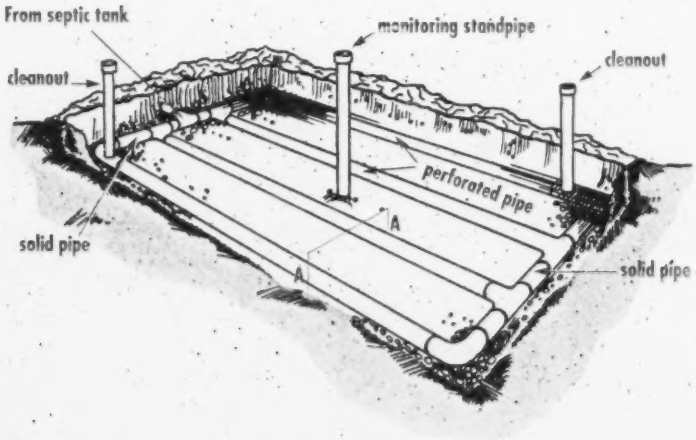

1.2 m (4') min
.9 m (3')
1.8 m (6')

SOIL ABSORPTION SYSTEMS

Two main types of soil absorption systems are used in the Yukon: the *absorption bed*, and the *absorption trench*. Due to cold winter climatic conditions, both the septic tank and the soil absorption system (if uninsulated) require a minimum soil cover of 1.2 m (4').

Absorption Bed

An absorption bed is a rectangular excavation containing 300 mm (12") of drain rock, perforated pipes, geotextile and standpipes that receive septic tank effluent. Absorption occurs only through the bottom of the bed.



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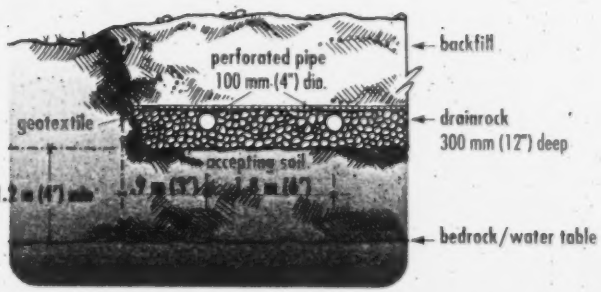
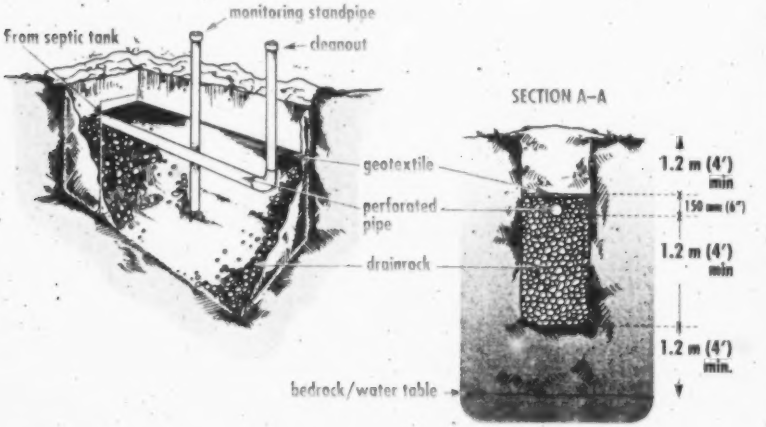


Deep Absorption Trench

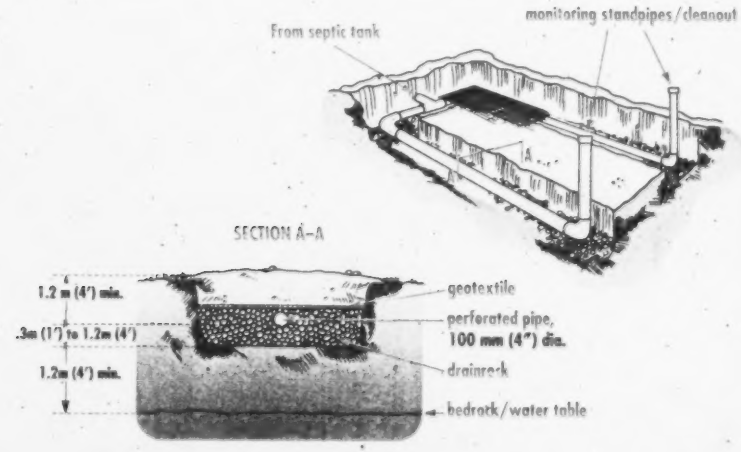
A deep absorption trench is 450 – 900 mm (18" – 36") wide and contains at least 1200 mm (4') of drain rock below the perforated piping. The effluent seeps into trench sidewalls from the drain rock.



Wide Absorption Trench

A wide absorption trench combines some of the features of the bed and deep trench and is usually 900 mm (3') to 1500 mm (5') wide and has 300 mm (12") to 1200 mm (48") of drainrock below the perforated pipe.

When trenches are installed parallel to each other, the separation distance between trench walls must be three-times the depth of the drain rock below the pipe or 3m (10'), whichever is greater.



DESIGN AND INSTALLATION

Planning Your System

Before designing a septic system, it is essential that complete and accurate site investigations are carried out. This is important to determine whether a lot is suitable for onsite disposal. For new house construction, these investigations should be carried out before the house design is completed in order to ensure that the house location is suited to the septic system location, thereby allowing you to determine the most cost effective design. The site investigation should include the following:

- Location and setback distances (see opposite page)
- Soil conditions (soil type and percolation rate)
- Surface features (ground slope, rock outcrops, traffic areas, etc.)
- Provision for expansion or replacement of septic system
- Depth to groundwater and bedrock (minimum vertical clearance from bottom of absorption system to groundwater is 1.2 m (4 ft.))

The percolation rate is a measure of the soil's ability to absorb liquid and is the single most important parameter used for sizing a soil absorption system. The percolation test must be performed according to procedures specified, a copy of which is available from Occupational and Environmental Health Services.

In the Yukon, many areas are suitable for soil absorption systems. However, there are some conditions which will prevent the installation of such a system. These include fine grained soils (very slow percolation rate), inadequate lot size, permafrost, inadequate distance to natural water bodies, and insufficient vertical clearances to bedrock and/or groundwater.

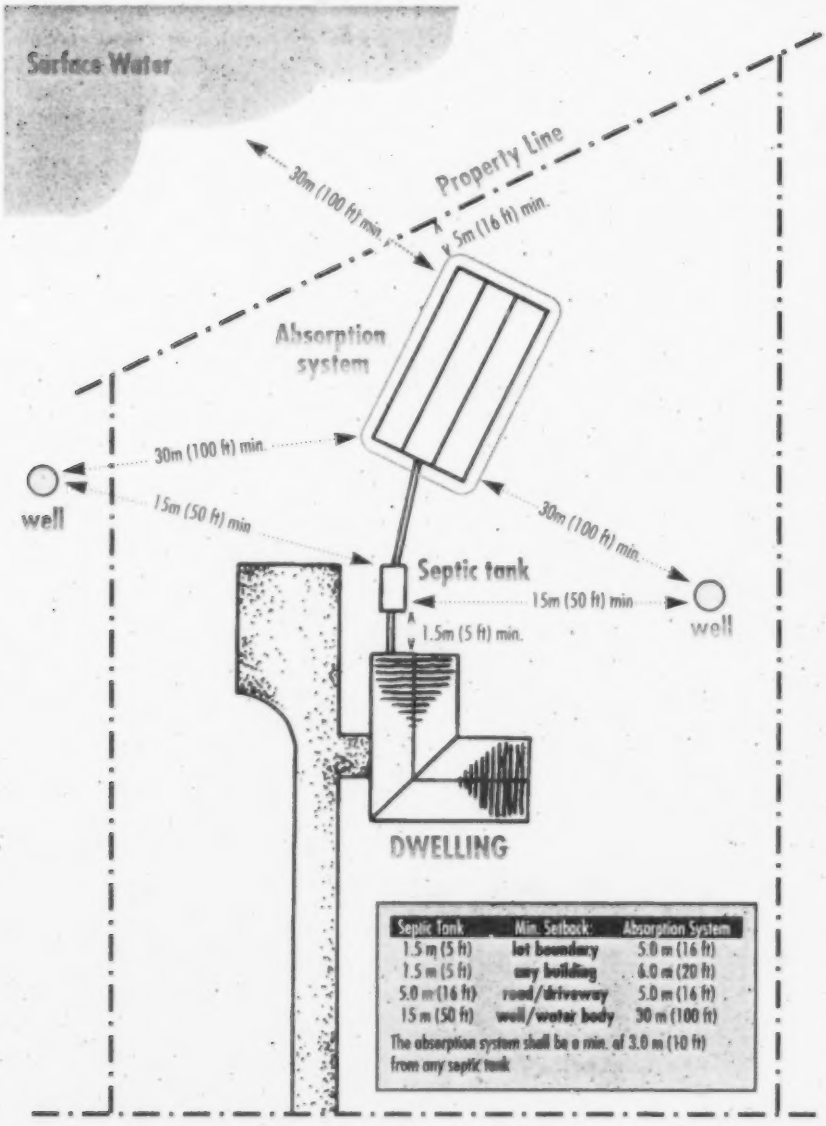
Design

Designs for septic systems can be completed by the homeowner, contractor or engineering consultant. Detailed information and advice, if required, is available from the Environmental Health Office in Whitehorse. A Permit to Install a Private Sewage Disposal System is required prior to the installation, modification or upgrading of any septic system. Developers should also check with local municipal requirements. A sewage disposal permit is required before a building permit may be issued by Building Inspectors for the Yukon Government or the City of Whitehorse.

Installation

It is very important that a septic system be installed carefully and in strict accordance with the approved design. Failure to do so may result in problems with the system. The septic tank must be installed and suitably bedded, design grades for building sewers must be adhered to, and care must be taken to ensure

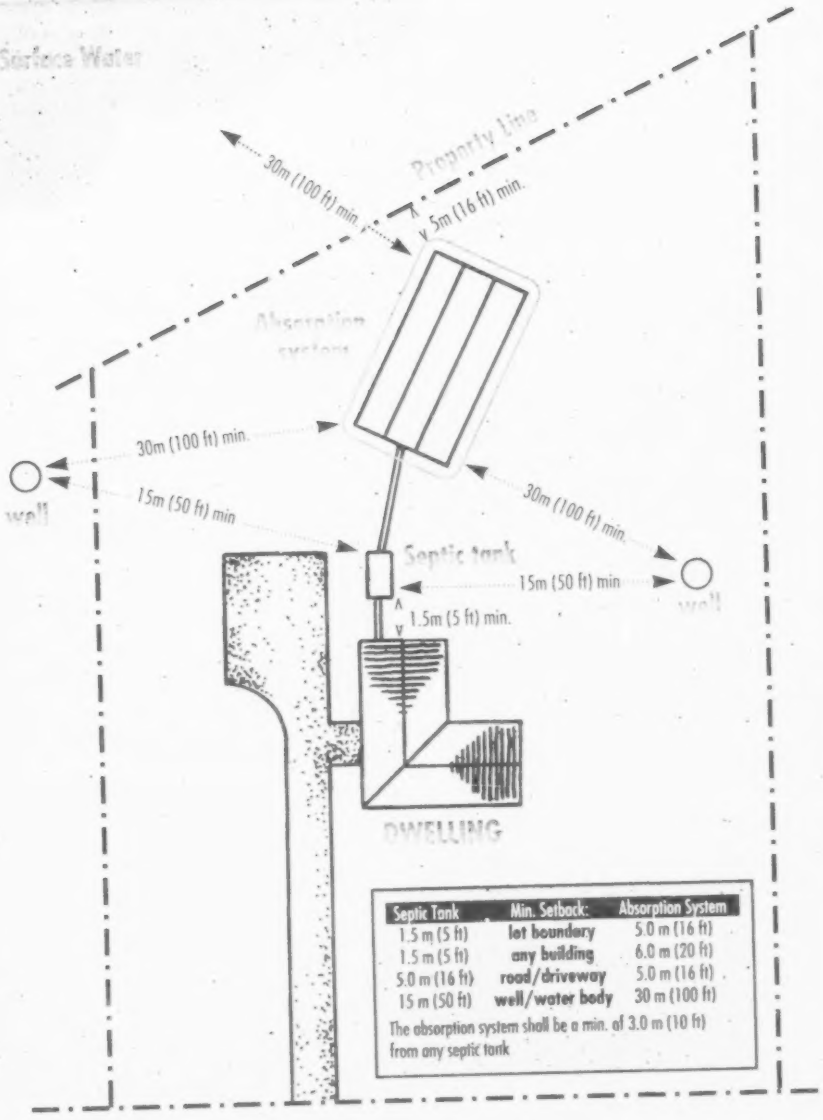
Minimum Setback Distances



Septic Tank	Min. Setback:	Absorption System
1.5 m (5 ft)	lot boundary	5.0 m (16 ft)
1.5 m (5 ft)	any building	6.0 m (20 ft)
5.0 m (16 ft)	road/driveway	5.0 m (16 ft)
15 m (50 ft)	well/water body	30 m (100 ft)

The absorption system shall be a min. of 3.0 m (10 ft) from any septic tank

the absorption bed components are installed according to the approved design. Further information and owner's responsibilities are outlined in **"Application and Permits"**.



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OPERATION AND MAINTENANCE

A sewage system which has been properly installed should, with proper care and maintenance, provide many years of service. There are, however, some things which you, the homeowner, should be aware of that will help the system to function properly. These are:

1. Surface Water

Do not allow roof drains to discharge to the septic tank or surface waters to drain towards the area of the disposal field.

2. Water Usage

Excessive and unnecessary water usage should be kept to a minimum in the home. If automatic washers and dishwashers are used, make sure full loads are washed each time. Excessive use of water, such as doing numerous washings in one day, could flush solids from the tank to the disposal field.

3. Garbage Disposal Units

Wastes from garbage disposal units are not easily digested by bacteria in the septic tank and only add to the volume of solids in the septic tank which must be removed by pumping the tank. Therefore, the use of garbage disposal units is ***not*** recommended.

4. Operation

Moderate use of household drain solvents, cleaners, disinfectants, etc. should not interfere with the operation of the sewage disposal system; but indiscriminate use may cause problems. Toilet paper substitutes, paper towels, newspaper, sanitary napkins, etc. should not be flushed into the septic tank since they will not readily decompose.

5. Starters and Cleaners

There is no need to use commercial "starters", "bacterial feeds", or "cleaners" for the septic tank or disposal field. Some additives can actually create problems by causing solids to be carried into the absorption system, resulting in soil clogging.

6. Inspection and Cleaning

The septic tank should be inspected once every year and the tank pumped out when necessary. As a minimum, the tank should be cleaned every two years. Failure to pump out a septic tank when required may result in sludge or scum being carried over to the disposal field, resulting in soil clogging and complete failure of the system. The tank should not be washed or disinfected after pumping. The cleaning should be performed by professionals familiar with proper procedures and having adequate equipment.

7. Vegetation

The area over a disposal field should have a good vegetation cover. However, shrubs or trees should not be planted over the area in order to allow the system to be kept open to sunlight.

8. Increased Waste Loads

If the waste loads and volumes of sewage entering the soil absorption system are greater than that for which the system was designed, failure of the field can occur. Contact the

Environmental Health Office regarding enlargement/repair/replacement options.

9. Vents and Accesses

During the winter, airtight caps should be securely fastened on all cleanouts and monitoring pipes. These pipes should also be fitted with insulation plugs to help discourage the escape of heat from the soil absorption system.

10. Traffic Over Absorption System

The area above and near a soil absorption system should never be used as a traffic area for vehicles or pedestrians. An accumulation of snow is important in order to maintain a cover of natural insulation to prevent freezing. During winter months, it is recommended that a snow fence or other suitable barrier be placed around the absorption system to discourage any traffic on the area. This will help maintain a thicker layer of snow insulation over the area.

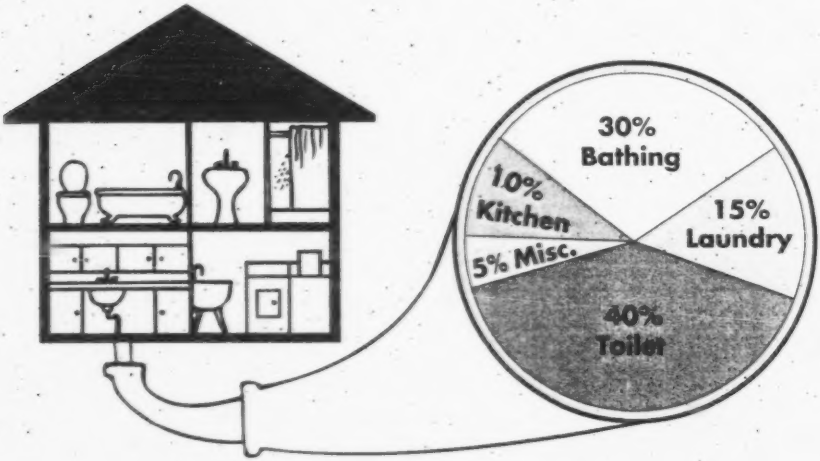
11. Periodic Occupancy

If the residence is used only periodically, or if extended absences occur, freezing problems can develop in the winter. Extra insulation (i.e. leaves, straw, sawdust, snow) over the system can help to reduce the freezing potential. When the house will be vacant for extended time periods, and there is a potential for freezing, it is advisable to have the septic tank emptied.

12. As-Built Plans

A detailed diagram showing the exact location of the septic tank and disposal field should be placed in a suitable location in the home for future reference along with the application, final approval certificate, and photos of the installation. This documentation can also be helpful when selling the property at a later date.

Water Usage of a Typical Household



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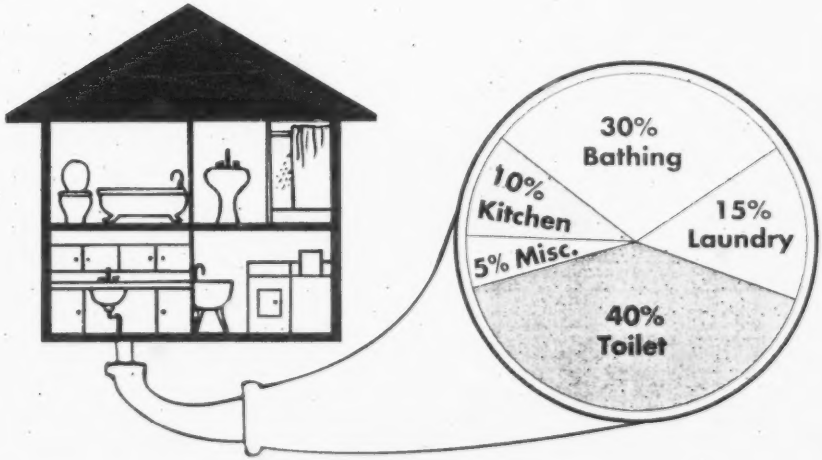


APPLICATION AND PERMITS

When you are planning to build a home on a property where there are no piped sewage services available, you must adhere to the Regulations Pursuant to the Public Health Act. Below is listed an outline of steps that would normally be followed from the time you have decided to install a septic system to completion of the installation.

1. Contact the Environmental Health Office to pursue your application requirements (i.e. application forms, standards, guidelines, etc.).

2. Carry out site investigations required to determine the suitability of your property for a septic system. This includes location and setback requirements, soils conditions (percolation test and soils investigations), surface features, and provisions for replacement or expansion. This can be done by the homeowner, contractor or engineering consultant.

3. Complete a septic system design and submit the necessary ***Permit Application*** to the Environmental Health Office. The Environmental Health Officer will assist you in completing the design if necessary, and can guide you through the application process. If all necessary data is supplied and the proposed system is judged suitable, a ***Permit to Install a Private Sewage Disposal System*** will be issued. Note that the permit is also subject to compliance with federal, territorial and municipal laws, including subdivision prospectus agreements.

4. After the sewage disposal permit has been issued, a building permit for new house construction may be issued by the municipal or territorial government. An occupancy permit will not be issued by the Building Department until final approval of the septic system is obtained from the Environmental Health Office.

5. Photographs must be taken, depicting each stage of the installation and as-built drawings of the system must be prepared. This includes photos of the excavation, drain rock placement (showing depth and quality), all piping, geotextile plus the septic tank prior to final backfilling. Such photos should be properly identified and dated.

6. Before backfilling a septic system, the owner or agent must contact the Environmental Health Office at least 72 hours before a final inspection is required. If the installation has been carried out properly, approval will be given to the owner in writing.

7. After construction, the owner must sign and submit a ***Notification of Installation and Undertaking to Maintain a Private Sewage Disposal System,*** together with copies of the photographs.

   Records of installation and a letter of approval will help in future sale of the property and in the processing of financing arrangements.

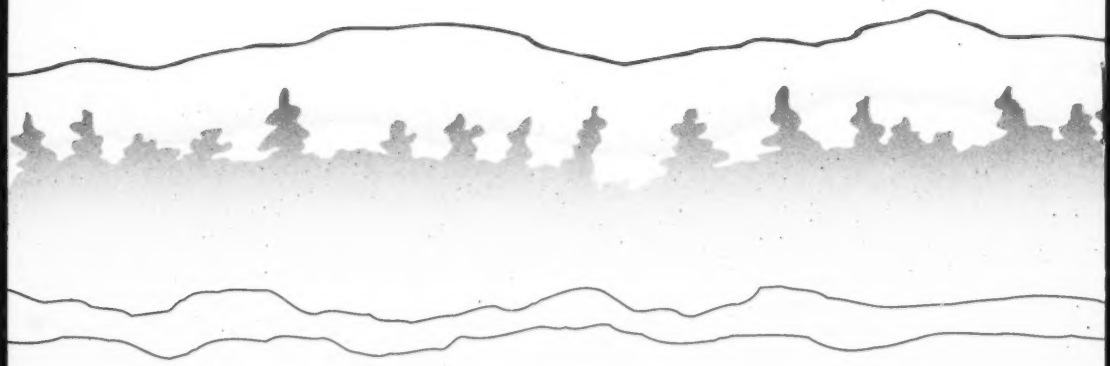
Glossary

Chemical and Biological Breakdown	*A natural treatment process whereby sewage is converted to other materials which are less harmful to humans and the environment.*
Drainrock	*Clean gravel, 20 to 65 mm (3/4 to 2-1/2") in diameter, with no more than 3% fines (0.080 mm) residual after screening. These specifications must be adhered to for final approval of soil absorption systems.*
Faecal Coliforms	*A large group of bacteria which normally thrive in the intestines of warm-blooded animals including humans. Their presence indicates recent sewage contamination.*
Geotextile	*An approved permeable filter fabric which prevents mixing of finer soil materials with the underlying drainrock.*
Microorganisms	*Organisms which cannot be seen with the naked eye, e.g. bacteria, viruses, and certain parasites.*
Percolation Rate	*The time rate of water drop in a test hole expressed as minutes per 25 mm (1"). The percolation rate must be determined in accordance with procedures specified by Occupational and Environmental Health Services. It is a measure of the soil's ability to absorb liquid and is the single most important parameter used to size a soil absorption system.*
Sand Filter	*Fine sand/silt material that has a percolation rate of 5 minutes/25 mm (1") or slower. In course, granular soils having a rapid percolation rate, a sand filter 600 mm (2 feet) deep must be installed to reduce the rate of effluent percolation through the soil to ensure adequate soil treatment of the effluent.*
Septic Tank Effluent	*The liquid that flows out from a septic tank.*
Set Back	*A separation distance, measured horizontally.*
Soil Absorption System	*A subsurface disposal system used to absorb effluent from the septic tank. Two main types of systems are the absorption bed and the absorption trench.*

For further information, contact:

Occupational and Environmental Health Services
100 – 300 Main Street
Whitehorse, Yukon
Y1A 2B5

Phone: (403) 667-3939 Fax: (403) 668-5726



Yukon
Health and Social Services

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